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# मानक

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IS 10435-1 (1983): Inverted Type Cable end Boxes for Outdoor Terminations Suitable for Paper Insulated Cables, Part I: Belted Type, Multicore Cables up to and Including II kV Grade [ETD 9: Power Cables]



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“Knowledge is such a treasure which cannot be stolen”



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IS : 10435 ( Part I ) - 1983

*Indian Standard*

SPECIFICATION FOR  
INVERTED TYPE CABLE END BOXES FOR  
OUTDOOR TERMINATIONS SUITABLE FOR  
PAPER INSULATED CABLES

PART I BELTED TYPE, MULTICORE CABLES UP TO AND  
INCLUDING 11 kV GRADE

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INDIAN STANDARDS INSTITUTION  
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG  
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*Indian Standard*

# SPECIFICATION FOR INVERTED TYPE CABLE END BOXES FOR OUTDOOR TERMINATIONS SUITABLE FOR PAPER INSULATED CABLES

## PART I BELTED TYPE, MULTICORE CABLES UP TO AND INCLUDING 11 kV GRADE

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*( Continued on page 9 )*

## *Indian Standard*

# SPECIFICATION FOR INVERTED TYPE CABLE END BOXES FOR OUTDOOR TERMINATIONS SUITABLE FOR PAPER INSULATED CABLES

## PART I BELTED TYPE, MULTICORE CABLES UP TO AND INCLUDING 11 kV GRADE

### 0. FOREWORD

**0.1** This Indian Standard ( Part I ) was adopted by the Indian Standards Institution on 24 February 1983, after the draft finalized by the Power Cables Sectional Committee had been approved by the Electrotechnical Division Council.

**0.2** This standard has been prepared to rationalise the types and sizes of inverted type cable end boxes intended for outdoor terminations, suitable for paper insulated cables.

**0.3** The standard would be issued in different parts. This part ( Part I ) covers requirements for end boxes for belted type, multicore cables up to 11 kV grade. The requirements for end boxes for screened type, non-belted cables up to 33 kV grade and end boxes suitable for epoxy compound, would be covered in subsequent parts of the standard.

**0.4** Main aim of the standard is to specify envelope dimensions of the cable end sealing boxes to ensure sufficient inner space for maintaining adequate clearance for cable end termination.

**0.5** This standard does not deal with the procedure for jointing or termination of cables.

**0.6** For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS : 2-1960\*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

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\*Rules for rounding off numerical values ( *revised* ).

## **1. SCOPE**

**1.1** This standard ( Part I ) covers the requirements for cable end boxes for outdoor terminations for paper insulated cables, belted type, multicore, up to and including 11 kV grade.

NOTE — Requirements for these types of cables are covered in IS : 692-1973\*.

**1.2** The cable end boxes covered in this standard are suitable for use with bitumen based filling compound.

## **2. TERMINOLOGY**

**2.1** For the purpose of this standard, the definitions given in IS : 1885 ( Part XXXII )-1971† shall apply.

## **3. MATERIALS**

**3.1** The shell of the end box shall be of cast iron. The casting shall conform to Grade FG 200 of IS : 210-1978‡. The casting shall be smooth and free from blow-holes and sharp projections.

**3.2** The bushings shall conform to IS : 2099-1973§.

**3.3** The cable connectors shall have sufficient current carrying capacity for the cable to be connected.

**3.4** Material used for stems and other conducting parts shall be of high conductivity electric grade copper or brass.

**3.5** The nuts and bolts used for cable connections shall be mechanically and electrically strong enough to take into account the size and the current rating of the cable.

**3.6** All nuts and bolts used for connecting the cable to the box shall be of either copper or brass.

**3.7** The cable gland shall be made of brass, aluminium or other suitable alloy and shall be either tapering or stepped type.

**3.8** Armour clamps fitted to the box shall be made of galvanized iron strips.

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\*Specification for paper insulated lead sheathed cables for electricity supply ( *second revision* ).

†Electrotechnical vocabulary: Part XXXII Cables, conductors and accessories for electricity supply.

‡Specification for grey iron castings ( *third revision* ).

§Specification for bushings for alternating voltage above 1 000 volts ( *first revision* ).



## 4. DESIGN AND CONSTRUCTION

**4.1** The box shall be designed in such a way that enough space is provided for manoeuvring the conductor inside the box. The mating of the top cover and shell of the box shall have a lip type fitting.

**4.2** The clearances to be maintained at the time of making termination are given in Table 1. The design shall be such that when actual terminations are made, it is possible to get these clearances.

**TABLE 1 CLEARANCES**

VOLTAGE	INSULATING MEDIUM	MINIMUM CLEARANCE BETWEEN PHASES	MINIMUM CLEARANCE TO EARTH	MINIMUM CLEARANCE TO EARTH OVER PORCELAIN OR SIMILAR OTHER MATERIALS	MINIMUM CLEARANCE TO EARTH OVER CABLE SURFACE
(1)	(2)	(3)	(4)	(5)	(6)
kV		mm	mm	mm	mm
Up to 3.3	{ Compound Air	20 90	20 60	25 —	75 —
6.6 and 11	{ Compound Air	50 170	50 120	75 —	125 —

**4.3** The glands shall be secured to the box by means of a metal plate which is fitted to the shell or forms a part of the shell with nuts and bolts so that it is made detachable from the shell.

**4.4** Threads of the bolts shall not penetrate into the shell. Filling plugs shall have flanges.

**4.5** The box shall be constructed in such a way that it is suitable for filling the insulating compound conforming to IS : 7084-1973\*.

**4.6** An expansion space above the level of filling medium shall be provided. Design of the box shall be such that when connections are made, a minimum distance of 50 mm can be obtained between the compound level and the top of the live part.

**4.7** The outside of the shell shall be painted black with weather-resistant paint.

\*Bitumen based filling compounds for electrical purposes.

## 5. DIMENSIONS

**5.1** The minimum envelope dimensions of the boxes shall be in accordance with Tables 2 and 3 ( see Fig. 1 and 2 ) for Types A and B respectively.

**TABLE 2 DIMENSIONS OF TYPE A BOXES ( FOR 1.1 kV CABLES )**  
( Clauses 5.1, 6.1 and 7.1 )

BOX TYPE NUMBER	SIZE OF CABLE CONDUCTOR	MINIMUM DIMENSIONS			
		A	B	C	D
(1)	(2)	(3)	(4)	(5)	(6)
	mm <sup>2</sup>	mm	mm	mm	mm
IC A1	Up to 70	325	275	45	200
IC A2	95 to 185	350	300	60	250
IC A3	225 to 400	375	325	75	300

**TABLE 3 DIMENSIONS OF TYPE B BOXES ( FOR VOLTAGES  
ABOVE 1.1 kV UP TO AND INCLUDING 11 kV )**  
( Clauses 5.1, 6.1 and 7.1 )

BOX TYPE NUMBER		MINIMUM DIMENSIONS			
		A	B	C	D
(1)	(2)	(3)	(4)	(5)	(6)
	mm <sup>2</sup>	mm	mm	mm	mm
IC B1	Up to 70	400	300	50	200
IC B2	95 to 185	450	350	75	250
IC B3	225 to 400	550	430	100	350

## 6. INFORMATION TO BE GIVEN WITH ENQUIRY AND ORDER

**6.1** To enable the manufacturer to provide the appropriate box in accordance with this specification, the purchaser shall give the following particulars at the time of enquiry and order:

- a) Voltage grade;
- b) Type number of the box ( see Tables 2 and 3 );

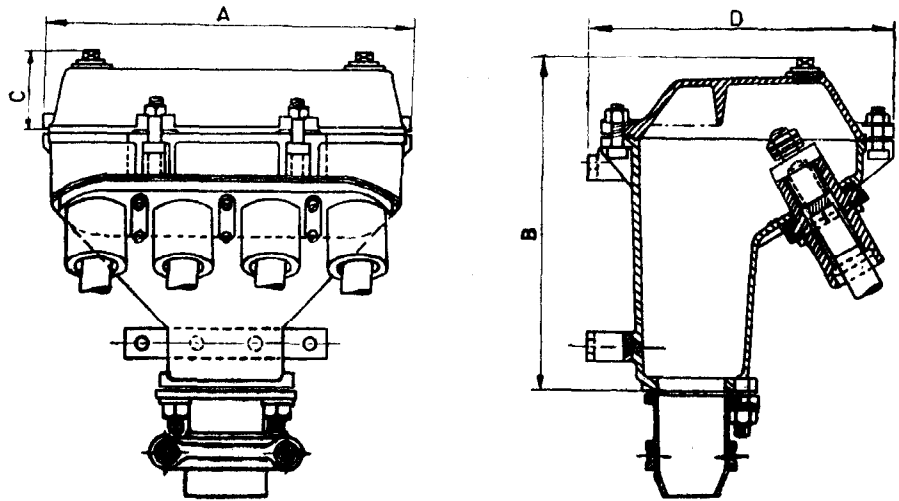


FIG. 1 OUTDOOR INVERTED BOX TYPE A

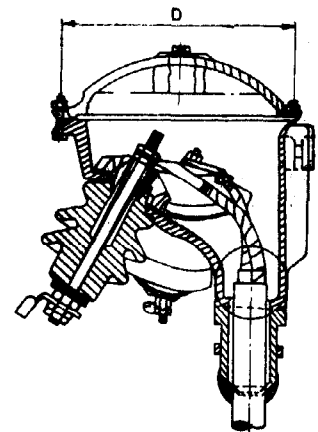
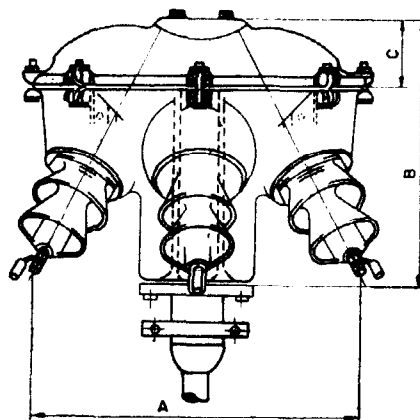
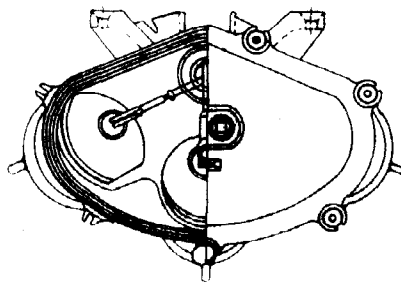


FIG. 2 OUTDOOR INVERTED BOX TYPE B

- c) Cable size; and
- d) Type of insulating compound to be used.

## **7. MARKING**

**7.1** The box shall be marked with the following information:

- a) Name of the manufacturer ( when specifically agreed, name of the purchaser may also be marked );
- b) Type number ( *see* Tables 2 and 3 );
- c) Voltage grade;
- d) Cable size; and
- e) Marking indicating up to which level the compound is to be filled.

NOTE — In case the design of the box ensures that the level of the filling compound will provide expansion space as prescribed in 4.6, the marking of the level would not be necessary.

**7.2** Cable end boxes may also be marked with the ISI Certification Mark.

NOTE — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution ( Certification Marks ) Act and the Rules and Regulations made thereunder. The ISI Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions, under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

## **8. TESTS**

**8.1 Hydraulic Test** — The box shall not show any leakage when subjected to hydraulic pressure of 100 kPa applied for a period of 15 minutes at room temperature. There shall be no permanent set after the release of the pressure.

**8.2 Voltage Test** — In case an insulated gland is provided, a voltage of 2 kV at 50 Hz shall be applied between the assembled insulated gland and the body of the box. There shall be no break-down when the voltage is thus applied for a period of one minute.

( Continued from page 2 )

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# INTERNATIONAL SYSTEM OF UNITS ( SI UNITS )

## Base Units

QUANTITY	UNIT	SYMBOL
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

## Supplementary Units

QUANTITY	UNIT	SYMBOL
Plane angle	radian	rad
Solid angle	steradian	sr

## Derived Units

QUANTITY	UNIT	SYMBOL	DEFINITION
Force	newton	N	1 N = 1 kg.m/s <sup>2</sup>
Energy	joule	J	1 J = 1 N.m
Power	watt	W	1 W = 1 J/s
Flux	weber	Wb	1 Wb = 1 V.s
Flux density	tesla	T	1 T = 1 Wb/m
Frequency	hertz	Hz	1 Hz = 1 c/s (s <sup>-1</sup> )
Electric conductance	siemens	S	1 S = 1 A/V
Electromotive force	volt	V	1 V = 1 W/A
Pressure, stress	pascal	Pa	1 Pa = 1 N/m <sup>2</sup>